Energy&Climate
INTELLIGENCE UNIT

COST OF NOT ZERO

IN 2022

EXECUTIVE SUMMARY

The impact of climate change hit home for the British public this summer with temperatures rising to 40.3 ˚C, setting a new record. The heatwave was made ten times more likely by climate change. At the same time the energy crisis, caused in part by Russia's invasion of Ukraine, created an extra strain for bill payers with gas prices hitting new highs.

Britain was the first G7 countries to commit to reach net zero emissions and now 91% of global GDP is covered by net zero targets. But progress on climate and energy policies to shift to newer, cleaner technologies has in some ways slowed in recent years, for example, with the ban on onshore wind farms. In this analysis we look at the cost impacts of delays in these policies to household bills and the UK as a whole.

The analysis has found that if the UK had not delayed in deploying renewables, insulation, rooftop solar panels, heat pumps and electric vehicles, some households could have saved around £1,750 on bills in 2022. Plus, homes are facing more than £400 extra in food bills this year because of the impact of climate change and oil and gas prices on the farming and food system. This amounts to a potential £2,150 added to household bills.

While this analysis focuses mainly on households, businesses could also have benefitted from faster deployment. For example, UK farms could have saved up to £1 billion over two years if they had been helped to install solar panels.

Deployment of these technologies would have involved significant initial investment, but these upfront costs would have already begun to pay off in the form of lower bills as well as stimulating growth in industries such as building, car manufacture and renewables.

UK RECEIPT

EXAMPLES OF UK-WIDE COSTS FROM CLIMATE CHANGE AND SLOW PROGRESS TO NET ZERO IN 2022

INSULATION FOR 9 MILLION HOMES	£2.8BN
HEAT PUMPS FOR 2.1 MILLION HOMES	£0.3BN
ELECTRICITY SAVINGS WITH MORE CFD RENEWABLES	£16.7BN
SOLAR PV PANELS FOR 6.3 MILLION MORE HOMES	£3.7BN
SIX MILLION MORE ELECTRIC CARS	£4.1BN
FOOD PRICE RISES (CLIMATE CHANGE & FOSSIL FUELS)	£11.4BN

TOTAL £39,000,000,000

HOUSEHOLD RECEIPT

COSTS IN 2022 FROM CLIMATE CHANGE AND SLOW PROGRESS TO NET ZERO COULD BE ADDING IN THE REGION OF

£2,150 TO HOUSEHOLD BILLS

INSULATION (EPC BAND D VERSUS C)*	£180
HEAT PUMP VERSUS GAS BOILER (EPC BAND C)	£140
SLOW PROGRESS ON CFD RENEWABLES	£220
SLOWED PROGRESS ON ROOFTOP SOLAR	£520
ELECTRIC VEHICLE VERSUS PETROL CAR	£690
FOOD PRICE RISES (CLIMATE CHANGE & FOSSIL FUELS)	£400

TOTAL £2,150

BECAUSE OF THE ENERGY PRICE FREEZE IN THE FINAL QUARTER OF 2022, THE UK GOVERNMENT COULD ALSO BE SAVING AROUND £150 PER HOUSEHOLD WITH EARLIER INVESTMENT IN RENEWABLES AND ENERGY EFFICIENCY.

* INSULATION SAVINGS ARE LARGER FOR WORSE PERFORMING HOMES E.G. £390 FOR UPGRADING A HOME FROM EPC BAND F TO C.

INSULATION

The UK was on an upward trajectory with home insulation until 2013 when government support schemes were cut. Since then, insulation rates have been 90% lower. Britain has the least efficient homes in western Europe.

The rationale for cutting insulation support was to reduce levies, saving a few percent of on total household energy bills. But this was at the cost of far higher savings from energy efficiency.

A home's energy efficiency is shown on its Energy Performance Certificate (EPC). Currently the average band for UK homes is D, but the government's ambition is for most homes to reach C by 2035.

Moving from band D to C reduces heating demand by 21%, jumping from E to C saves 32% and the leap from F to C saves 37%.

And the savings from lower energy use are far higher during the current gas crisis.

Band D homes could have saved £221 on their energy after an upgrade, band E would have saved £391 and a band F home £476 in 2022. Over 80% of the savings would be taken from household bills and the rest would be a cut to the government's price freeze costs.

If government help had continued, a million extra homes could have been insulated every year, totalling ten million since 2013. If all of them had moved from EPC band D to C, then the total cost savings would have been £2 billion, £1.65bn for households and £350m for the government, which is paying part of the bills in the final quarter of the year.

There are an estimated 4.5 million homes on the least energy efficient ratings of E to G. If the government had targeted these homes for help as part of the nine million upgrades and taken the other 4.5 million from band D homes, the savings would have been even greater.

£2.8 billion in 2022, £2.3bn for households and £500 million for the government.

HEAT PUMP

Heating accounts for around 14% of the UK's emissions and heat pumps will be the likely route to decarbonising people's homes. As they run on electricity rather than gas, they have far lower emissions and will be zero emissions once the power grid becomes net zero.

Heat pumps have already replaced one fifth of boilers in Europe. The UK is lagging far behind countries such as Estonia and Poland. Estonia sold 1,583 heat pumps per 100,000 people in 2021 and Poland sold 259 per 100,000, 25 times and 4 times more than the UK at 63 in 100,000.

The government target is to install 600,000 heat pumps a year by 2026. The Boiler Upgrade Scheme was launched this year with grants towards air source and ground source heat pumps. But in total, the scheme is expected to fund just 90,000 installations until it ends in March 2025.

Had we matched Estonia, domestic gas use in Britain would have been a third lower during the current gas crisis.

Replacing a gas boiler with a heat pump eradicates all gas costs, including the standing charge of around £100 a year. The standing charge is the fixed daily amount households pay for energy, no matter how much they use. Heat pumps run on electricity, which costs more per unit, but they are typically at least three times more efficient. This means the total cost of heating is lower.

The saving for a typical home with a heat pump in 2022 was £145 a year. For a home with insulation upgrades to band C plus a heat pump, the total savings were £350.

If the government's target came five years earlier – 600,000 heat pump installations a year by 2021, ramping up from 2016 (when it had also been expected to push for heat pumps in new-build homes). There would be 2.1 million heat pumps in operation in existing homes by 2021.

This could have meant savings of £320 million in 2022 – almost all of which would have gone directly off household bills.

NEW BUILD HOMES

New-build homes are expected to meet standards of energy efficiency or greenhouse gas emissions. 'Fabric energy efficiency' describes how well new buildings retain warmth and the power required to heat them. It is measured in kWh/m2 per year.

But in the past seven years the UK has continued building homes to poor standards and with limited inspections to determine whether even those standards are being met.

Standards have not been raised. The Zero Carbon Homes standard was expected to be adopted in 2016 but was scrapped (a representative of a major housebuilder told a Commons Select Committee he campaigned against it). The Future Homes Standard has suffered years of slow consultation, was meant to start in 2023 but has now been put back to 2025.

In this time, newbuilds have been allowed to have gas boilers. A requirement to have a heat pump has still not been confirmed for 2025 and another major housebuilder has lobbied against it during consultation.

An uplift in standards introduced in 2022 roughly equates to the basic level of performance that would've been required by the Zero Carbon Homes (ZCH) standard in 2016, but six years late. The level required by the Future Homes Standard from 2025 will match more advanced performance proposed by the Zero Carbon Homes, but nine years late.

Currently new houses use 150% more heat than both the ZCH advanced performance and FHS targets. This puts excess costs in 2022 at £300 (£250 to the household and £50 to the government) or £430 (£370 a home and £60 for the government) if standards included heat pumps.

Around 200,000 new homes were built each year from 2016 to 2021, that's a total of 1.2 million.

If ZCH had been adopted in 2016, as planned, and upgraded to advanced standards in 2019, the UK would have built 600,000 homes to ZCH basic standard and another 600,000 to ZCH advanced. If they were all built using heat pumps:

In 2022, £440 million would have been saved (£370 million for households and £70 million for the government). And the UK would have used 1.5TWh less gas, lowering our gas imports by one percent at a time when every reduction helps.

These savings require upfront investment of an extra few percent of the building costs. The price of a new-build home is not simply the sum of its parts – it is also affected by land prices and the local market for existing homes. Major housebuilders make around £60,000 profit (20%) per home.

ELECTRICITY

To promote renewables deployment, the government created Contracts for Difference (CfDs), which guarantees a fixed price per unit of low-carbon power generation. These have been the main source of funding for renewable generators since 2016. Under CfDs, projects compete against each other in auctions to secure a fixed electricity price for their generation.

CfDs provide stable income for renewable power and lower costs for homes. It was hoped these contracts would lower bills in the future, but they already are during the gas crisis. Renewables are currently bringing down the high wholesale prices for energy.

Wind farms are set to have paid back an estimated £660 million in 2022, through cheaper energy generation as part of the CfD scheme. This amounts to £10 per home. But had Britain moved faster with CfDs, there would be greater power generation from renewables now and this would have further eased the high energy bills of homes across the country.

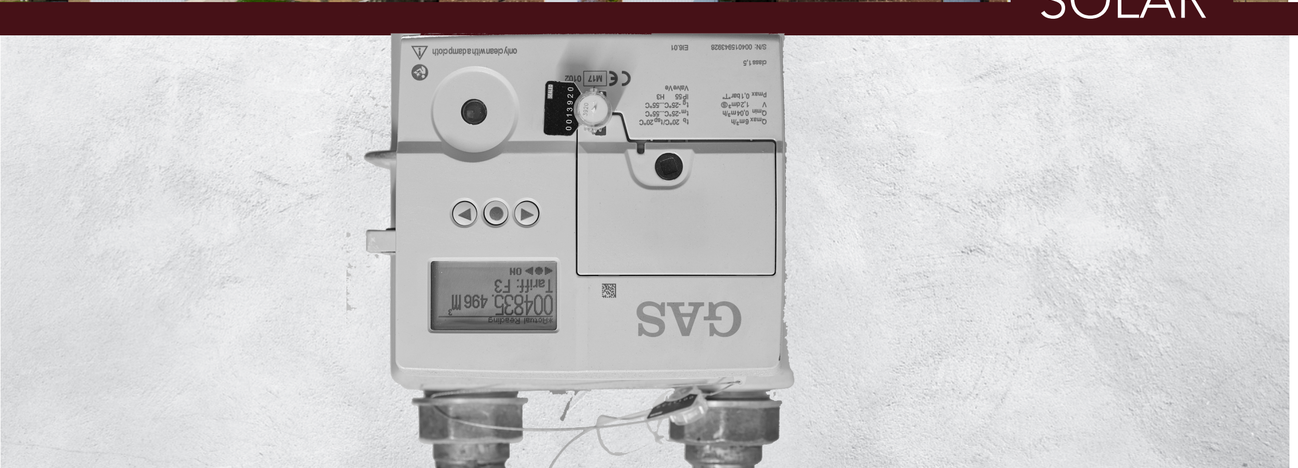
The government target is for 50 gigawatts (GW) of offshore wind by 2030 and 70GW of solar power generated by 2035. It was said around the 2022 Energy Security Strategy that the government considered a target of 45GW of onshore wind by 2035. The UK currently generates 15GW of power through onshore wind.

But a series of government decisions have put up hurdles for renewable infrastructure. The ban on onshore wind in England and the exclusion of onshore wind and solar from two rounds of CfD auctions have led to stalling deployment.

If the government had set these targets earlier and then issued CfDs for renewables at a constant rate to meet those targets, then by 2022 we could have had an additional 9GW of onshore wind, 17GW of offshore wind and 17GW of solar. Added together, those CfD renewables could have saved Britain £6.6 billion this year on top of the actual savings, that's £100 extra per home (£85 for the household and £15 for the Government).

Faster switching to renewables could have enabled power generators to improve performance and cut prices sooner, potentially saving £17bn or £260 per home in 2022, (£220 for the household and £40 for the government).

SOLAR



Rooftop solar panels capture the sun's energy and convert it into power to use on household appliances or direct back into the national grid. They are currently installed on one million UK homes.

A large proportion of these homes had their panels installed under feed in tariffs (FiTs), a system designed to support renewables by guaranteeing an above market price for producers. FiTs were hugely popular, but tariffs were reduced in 2013 and closed to new joiners in 2019. Solar panels have fallen in cost so the economics have changed, so support could have been phased down .

Solar panels are generally rated at 3kW power. Over the course of a year, this would create enough energy to power a home. But not all of that energy can be used in that home, it is usually about half.

A home getting half of its power from solar would save £520 in 2022. And not getting that half of its power from the grid would save £400. Exporting 50% to the grid would raise a payment at a lower unit rate of £120.

The saving of £520 from solar takes an average electricity bill down from £940 to about £420 in 2022, with the government also saving £70 on the home due to the energy price freeze.

One million UK homes have solar panels installed. Their total savings will have been almost £600 million in 2022.

Installation rates from 2011 to 2021 averaged 7,300 a month, according to government figures. But the highest installation rates were found in November 2011, with 55,000 homes putting solar panels up. This was seven and a half times the average monthly rate.

Imagining the maximum rate was kept up in the years from 2011 to 2021, there would be 7.3 million more homes with solar panels, about a quarter of all households.

UK-wide savings in 2022 would be £3.7 billion higher, about £4.3 billion in total.

CARS

Norway is leading the world in the transition to electric vehicles – as of September 2022, 77.7% of the new cars sold in the country were electric.

In the UK, EVs recently passed 20% as a proportion of new vehicle sales. Whilst towards the front of the pack of major economies in EV uptake, it lags a long way behind the likes of Norway.

The total costs of ownership of an EV over the course of its lifetime are already lower than an equivalent petrol car. But high initial sticker prices, and the lack of a developed second-hand market, mean EV uptake is largely driven by fleet operators and higher income households.

Britain could improve EV uptake and enable poorer households to access savings from EV ownership by bringing forward a ZEV (Zero Emission Vehicle) mandate – a requirement for car manufacturers to ensure a certain proportion of new cars sold are electric.

Not only would this speed up the availability and uptake of new EVs, it would help develop a healthy and affordable second-hand market. This would extend the benefits of EV ownership to less well-off households.

Research by ECIU has found that EVs are typically three times cheaper to run than their petrol equivalents under current energy prices. A mid-sized car would have been 3.4 times cheaper to run in 2022, saving £690 a year. This cost saving is largely because the majority of charging is typically done at home on domestic power rates.

There are currently 620,000 EVs on British roads. This saves £430 million on energy costs in 2022.

But it is just 1.8% of the UK's total car fleet of 35 million.

If the UK had incentivised EV uptake in a similar way to Norway, where EVs now make up 18.9% of cars, ten times Britain, then there would be a further 6 million EVs on our roads. This would save £4.1 billion in energy costs in 2022.

That's a possible 6.6 million EVs saving £4.5 billion.

FOOD

Global food supplies have been hit by droughts, floods, the war on Ukraine and extreme temperatures in 2022. Climate change and use of fossil fuels account for 88% of current food price inflation.

As of July 2022, food inflation was recorded at 12.7% and is second only to fuel bills in the rising cost of living faced by UK households.

Climate change and a reliance on fossil fuels have added £400 to the average annual food shoping bill in 2022. This could have been reduced with a shift away from oil and gas.

£11.4 billion has been added to food costs by climate change and fossil fuels in 2022.

REFERENCES AND METHODOLOGY

This analysis presents some of the key costs of climate change and slow progress towards net zero, but it is not an exhaustive list. The actual costs are higher. Covered here are the major expenses of households, but not all the costs they face.

This analysis includes some costs of companies, such as EVs and savings from CfDs, but not other business costs such as the impact of most farms not having renewables. Some benefits from renewable deployment on farms would be passed on to consumers, so household savings would be higher than shown here.

Impacts per household were calculated using the following input data:

- Annual household electricity demand and gas demand (and by proxy, heat demand) by EPC band, as per NEED tables 27 and 28 (BEIS, 2021)
- Weighting of household gas demand: Q1 42.2%, Q2 16.4%, Q3 7.6%, Q4 33.7%.
- Weighting of electricity demand: Q1 28.5%, Q2 22.1%, Q3 21.2%, Q4 28.2%.
- Unit prices for gas and electricity are taken from Ofgem's price cap models. For Q4 2022, these are split between the household and the government as per the Energy Price Guarantee. Unit prices for year are weighted averages using quarterly demand.
- Insulation benefits for existing homes were calculated using the differences between mean gas demand for different EPC bands.
- A heat pump can be installed in most homes but was modelled in a band C existing home to illustrate the scenario of also upgrading insulation to that level. Efficiencies were taken as 85% for a gas boiler and a COP of 3.5 for a heat pump.
- New-build homes' heat demand was specified for the ZCH, whereas the 2022 Uplift and the FHS instead specify carbon targets. Modelling by industry experts allows comparison on the basis of specific energy demand: 40-45kWh/m2 per year for ZCH basic level and 2022 Uplift; 25kWh/m2 per year for ZCH advanced level and FHS. Standards in force from 2014 to 2021 required 55-60kWh/m2 per year, but actual performance is estimated at 64kWh/m2 per year. The leading practice of Passivhaus requires 15kWh/m2 per year. Heating demand and efficiencies were based on the same data as for existing homes.
- CfD savings were calculated on a national basis (see below), and then split 43%:57% between homes and domestic customers, and then divided by 29million homes.
- Solar PV panels are assumed to have power rating of 3kW and load factor of 11%, such that annual output matches typical household demand. It is assumed that the home can use half and half is exported, such that grid imports meet half of demand.
- Average car mileage of 5,300miles per year, assumed to be evenly distributed between quarters – so the unit price for the year is a simple average of the quarterly prices. This unit price is then modified to reflect different charging prices (home night, home day, public). Total costs are determined based on typical charging behaviour (70% home night, 20% home day and 10% public).
- Food price rises were taken from previous analysis for ECIU: Climate change, fossil fuels, and UK food prices (ECIU, 2022)

Impacts on UK-wide scale were estimated as follows:

- Insulation deployment was modelled using 2012 installation rates, such that 9 million homes would have been upgraded to band C before 2022, as per previous ECIU analysis: Insulation and gas prices (ECIU, 2022)
- Heat pump deployment was modelled based on the government's current five-year trajectory (target set in 2021 to increase installation rates from 60,000 per year in 2021 to 600,000 per year by 2026), but implemented five years earlier, from 2016 (the date when heat pumps were expected to become common in new-builds, until the ZCH was scrapped), which would have resulted in 2.1 million heat pumps in existing homes ahead of 2022.
- New-build benefits were modelled on the basis of an average of 200,000 homes built per year. Standards were based on the current situation of the 2022 Uplift followed three years later by the FHS in 2025, but instead with the ZCH being introduced in 2016 as planned (with its basic insulation level and a requirement for heat pumps), and then improved in 2019 (to its advanced insulation with heat pumps).
- CfDs were modelled on the basis of targets (50GW offshore wind by 2030, 70GW solar by 2035) and a mooted target (45GW onshore wind by 2035), but as if these targets had been set earlier and steady progress made such that capacities rose linearly from initial levels (from RO deployments) in 2016 towards the targets. Changes in load factors and strike prices were assumed to take place in the same years as seen in the actual deployment. The model was then re-run with changes in load factors and strike prices occurring at capacity milestones, i.e. in earlier years.
- Solar deployment used the maximum monthly installation rate from that period (55,300) for every month of the 11 years 2011 to 2021. That rate occurred in November 2011, which suggests that a) winter is not an impediment and so installation can be high year-round, and b) the industry was geared up early in that period and so rates could have been high throughout.
- Electric car uptake was modelled using market share in Norway compared to the UK.